

WHAT IS CLAIMED IS:

1. An etching apparatus functioning to process a wafer having on a surface on which a desirably patterned mask for etching is formed, in a plasma etching process chamber and trim-treat said mask under etching action by plasma so as to reduce the width of said patterned mask, said apparatus comprising:

a plasma monitor for measuring an amount of radicals in said plasma process chamber; and

trimming condition calculating means for calculating a condition required for said trimming treatment to obtain a desired mask width on the basis of a precedently measured width dimension of said patterned mask and a precedently measured amount of roughness of a mask edge as well as the amount of radicals measured by said plasma monitor,

wherein the trimming treatment is carried out for the trimming condition calculated by said trimming condition calculating means.

2. An etching apparatus according to claim 1, wherein continuously to said trimming treatment, a treatment of etching said wafer is performed in said plasma etching process chamber.

3. An etching apparatus according to claim 1, wherein the mask edge roughness amount is calculated on the basis of an aspect ratio of a mask edge roughness portion.

4. An etching apparatus according to claim 1,

wherein the edge roughness amount is calculated on the basis of a Fourier frequency of the shape of a mask edge roughness portion.

5. An etching apparatus according to claim 1, wherein an optical emission spectrometer is used as said plasma monitor.

6. An etching apparatus according to claim 1, wherein said required condition is a time required for the trimming treatment.

7. A mask trimming method in which a wafer having on the surface of which a desirably patterned mask for etching is formed is processed in a plasma etching process chamber and thereafter, plasma is generated in said plasma etching process chamber to trim-treat said mask under the etching action by said plasma so as to reduce the width of said patterned mask,

said method comprising the steps of:

measuring an amount of radicals in said plasma process chamber by means of a plasma monitor;

calculating a condition required for said trimming treatment to obtain a desired mask width, on the basis of the amount of radicals measured by said monitor as well as a precedently measured width dimension of said patterned mask and a precedently measured amount of roughness of a mask edge; and

carrying out the trimming treatment for the calculated trimming condition.

8. A mask trimming method according to claim 7, wherein an etching treatment is carried out in said plasma etching process chamber continuously to execution of said mask trimming step.

9. A mask trimming method according to claim 7, wherein said required condition is a time required for the trimming treatment.